National Aeronautics and
Space Administration

Science Committee Report

Dr. Bradley M. Peterson
Chair, Science Committee

Science Committee Members

Brad Peterson, Chair, The Ohio State University
Carle Pieters, Vice Chair, Brown University

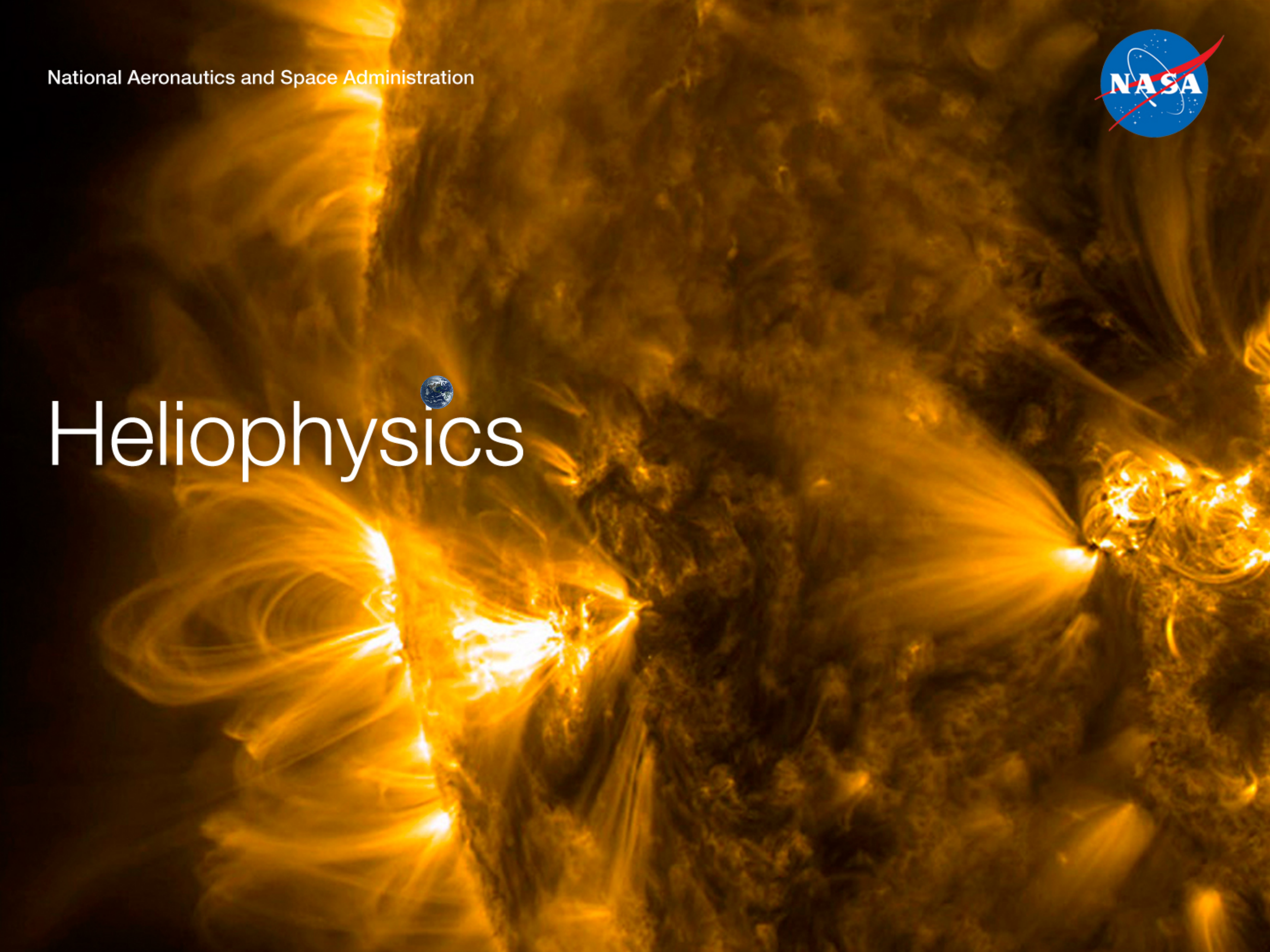
Janet Luhmann, UC Berkeley, Chair of Planetary Science Subcte
Steve Running, University of Montana, Chair of Earth Science Subcte
Scott Gaudi, The Ohio State University, Chair of Astrophysics Subcte
Jill Dahlburg, Naval Research Laboratory, Chair of Heliophysics Subcte (NEW)
Robert Lindberg, University of Virginia, Chair of Planetary Protection Subcte

Doug Duncan, University of Colorado
Mark Robinson, Arizona State University
Harlan Spence, University of New Hampshire
James Green, University of Colorado at Boulder
Robert Kirshner, Harvard University
Susan Avery, Woods Hole Oceanographic Institute
Tamara Jernigan, Lawrence Livermore National Laboratory (NEW)
Walter Secada, University of Miami (NEW)

David Spergel, Chair of Space Studies Board (*ex officio* member)

Outline

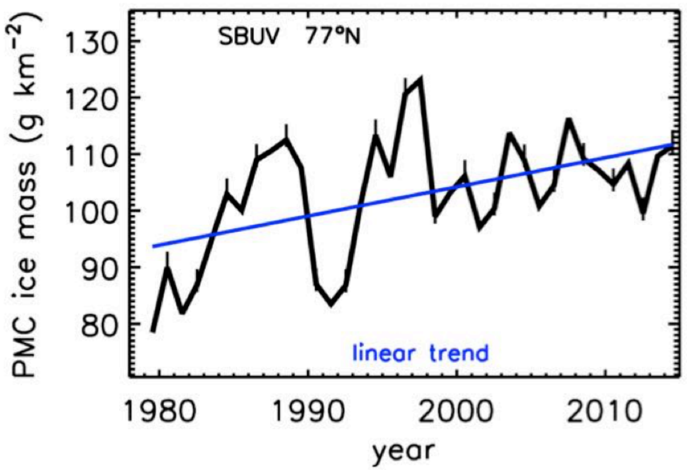
- **Science Results**
- Programmatic Status
- Findings and Recommendations

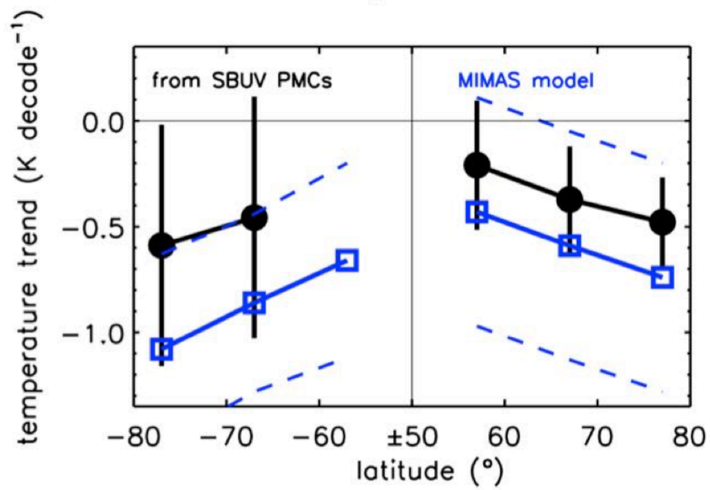

National Aeronautics and Space Administration
Heliophysics

AIM and SBUV satellite data shows that air on the edge of space is getting colder and more humid

RESULTS POINT TO A GROWING BELIEF THAT GREENHOUSE GASES AND GLOBAL CHANGE HAVE INCREASED THE NUMBER AND BRIGHTNESS OF PMCS.

- Polar Mesospheric Clouds (PMCs) occur ~50 miles above the earth surface in polar summer
- Analysis of 36 years of PMC data measured by the SBUV instrument show that PMC ice mass has been increasing
- AIM/SOFIE observations allow a rigorous interpretation of SBUV PMC change revealing that temperatures are decreasing by 0.5±0.2 K per decade and H2O is increasing by 0.07± 0.03 ppmv per decade
- Changes in both temperature and H_2O are equally important in causing PMCs to vary
- The observed changes have been anticipated due to increasing CO_2 and CH_4.



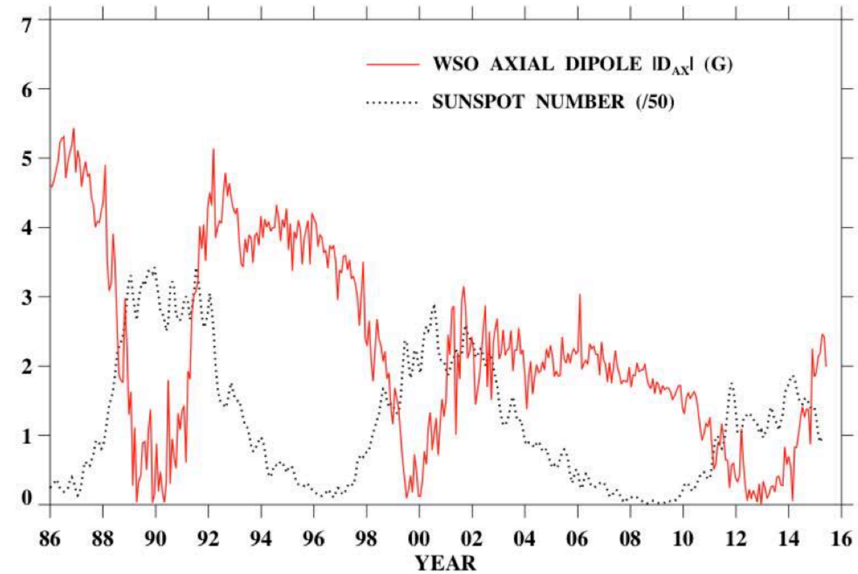


*Hervig, Mark E., Uwe Berger and David E. Siskind, Decadal variability in PMC and implications for changing temperature and water vapor in the upper mesosphere ,*J. Geophys. Res. Atmos., 121*, doi:10.1002/2015JD024439

Solar Cycle 25 will have an amplitude similar to that of the current Solar Cycle 24

In dynamo models of the Babcock-Leighton type, the Sun's axial dipole component provides the seed for the sunspots of the next cycle. The axial dipole strength during the declining phase of each cycle is thus a good predictor of the amplitude of the following cycle.

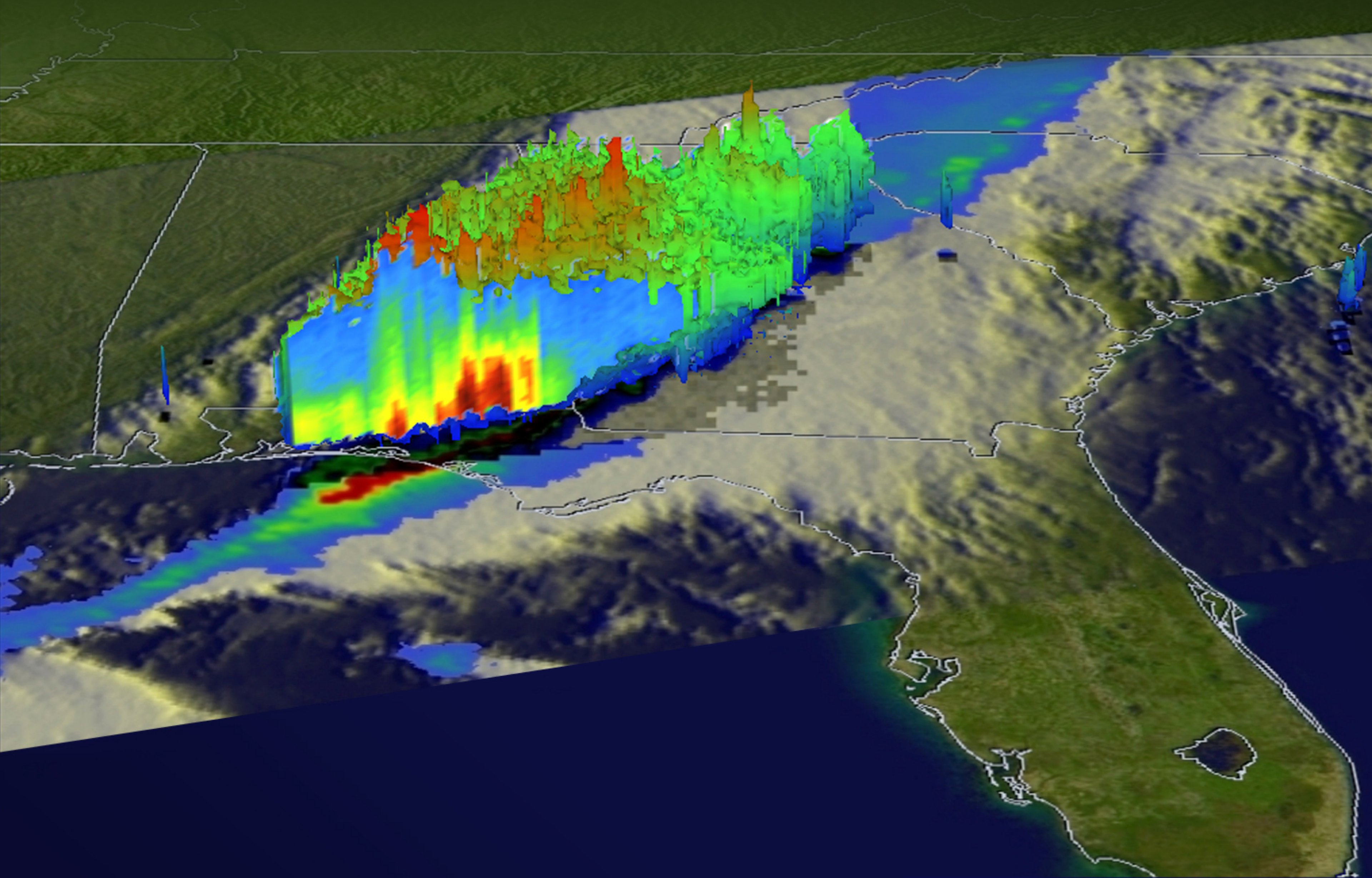
As shown at the right, the Sun's axial dipole component went through zero in 2012 and has now increased to a strength comparable to its strength during 2002-2008.



Sheeley & Wang, ApJ, 809, 113 (2015): The recent rejuvenation of the Sun's large-scale magnetic field: a clue for understanding past and future sunspot cycles;
Wang & Sheeley, ApJ, 694, L11 (2009): Understanding the geomagnetic precursor of the solar cycle.

The Sun is not about to enter another Maunder Minimum!

EARTH SCIENCE



Eastern China Emissions Offset 43% of the Expected Reduction in Mid-Tropospheric Ozone over the Western US from 2005-2010

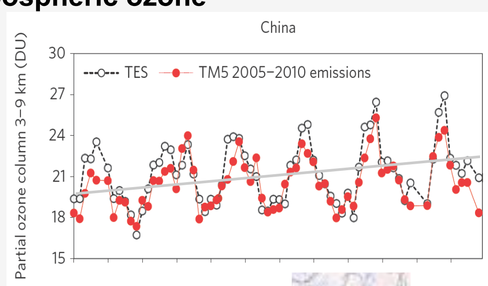
Verstraeten et al., *Nature Geosci.*, 2015

Over the past decade, China has undergone rapid population growth and industrialization. At the same time, the US experienced an economic recession and implemented increasingly strict emissions controls.
Satellite measurements illuminate how these differences in development and policy are manifested in terms of changes in tropospheric ozone - a harmful pollutant and potent greenhouse gas.

Aura measurements were combined with a model to quantify and attribute observed ozone changes to: Regional emissions; Long-range transport; and downward transport from the stratosphere. **Natural stratospheric variability played a surprisingly large role in tropospheric ozone trends; *and Chinese emissions offset a large portion of the reduction in mid-tropospheric ozone*** that should have occurred over the Western US due to emission reduction policies. The absolute impact of Chinese emissions has thus far been small, but its future magnitude is highly uncertain.

Aura's Microwave Limb Sounder: Temporary increase in downward transport from the stratosphere partly due to 2009-2010 El Nino.

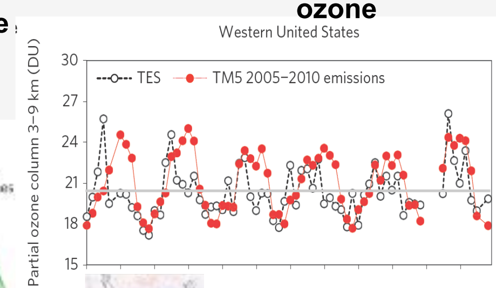
Aura's Tropospheric Emission Spectrometer (TES): 7% Increase in mid-tropospheric ozone



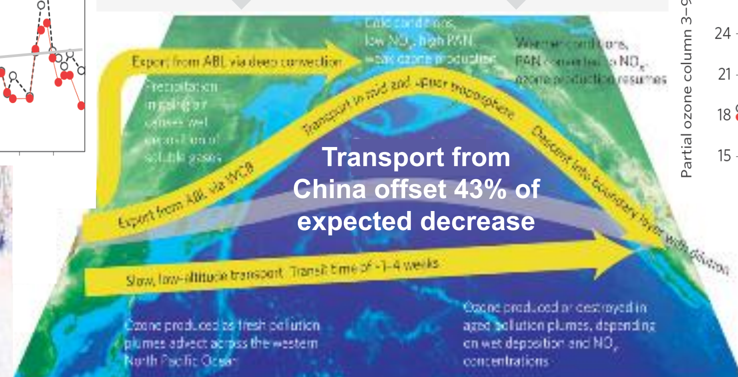
Explains 50% of the ozone increase

Offset 57% of expected ozone decrease

TES: No change in mid-tropospheric ozone



OMI: 21% increase in NO_x emissions. Explains 50% of the ozone increase.

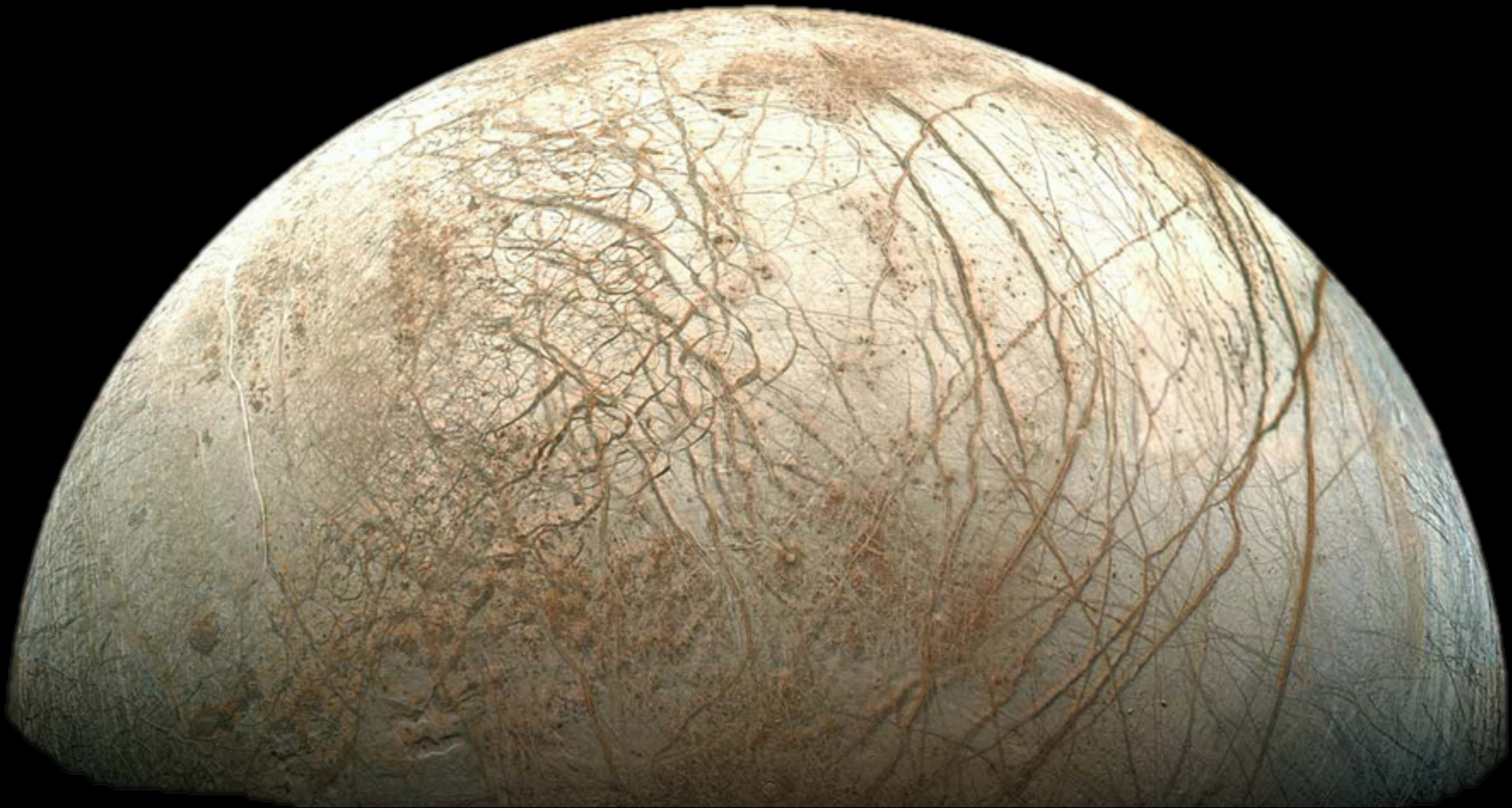


OMI: 21% decrease in NO_x emissions. Should have given a 2% decrease in ozone

Model-derived increases in surface ozone are ~2x mid-tropospheric ozone changes

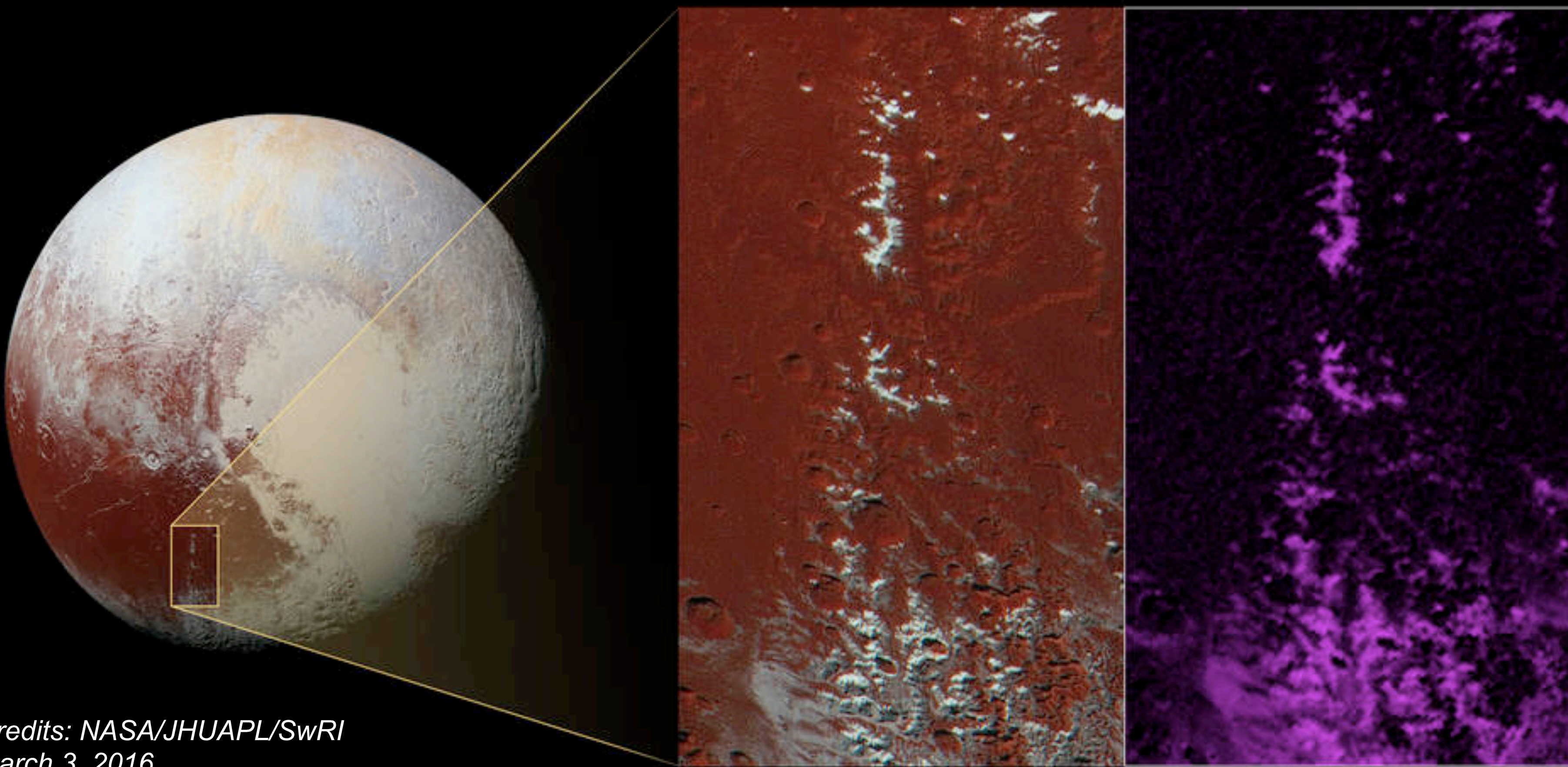
Model-derived impact of Chinese emissions at the surface <1/2 their impact in the mid-troposphere

Planetary Science



Methane Snow on Pluto’s Peaks

The New Horizons team has discovered a chain of exotic snowcapped mountains stretching across the dark expanse on Pluto.

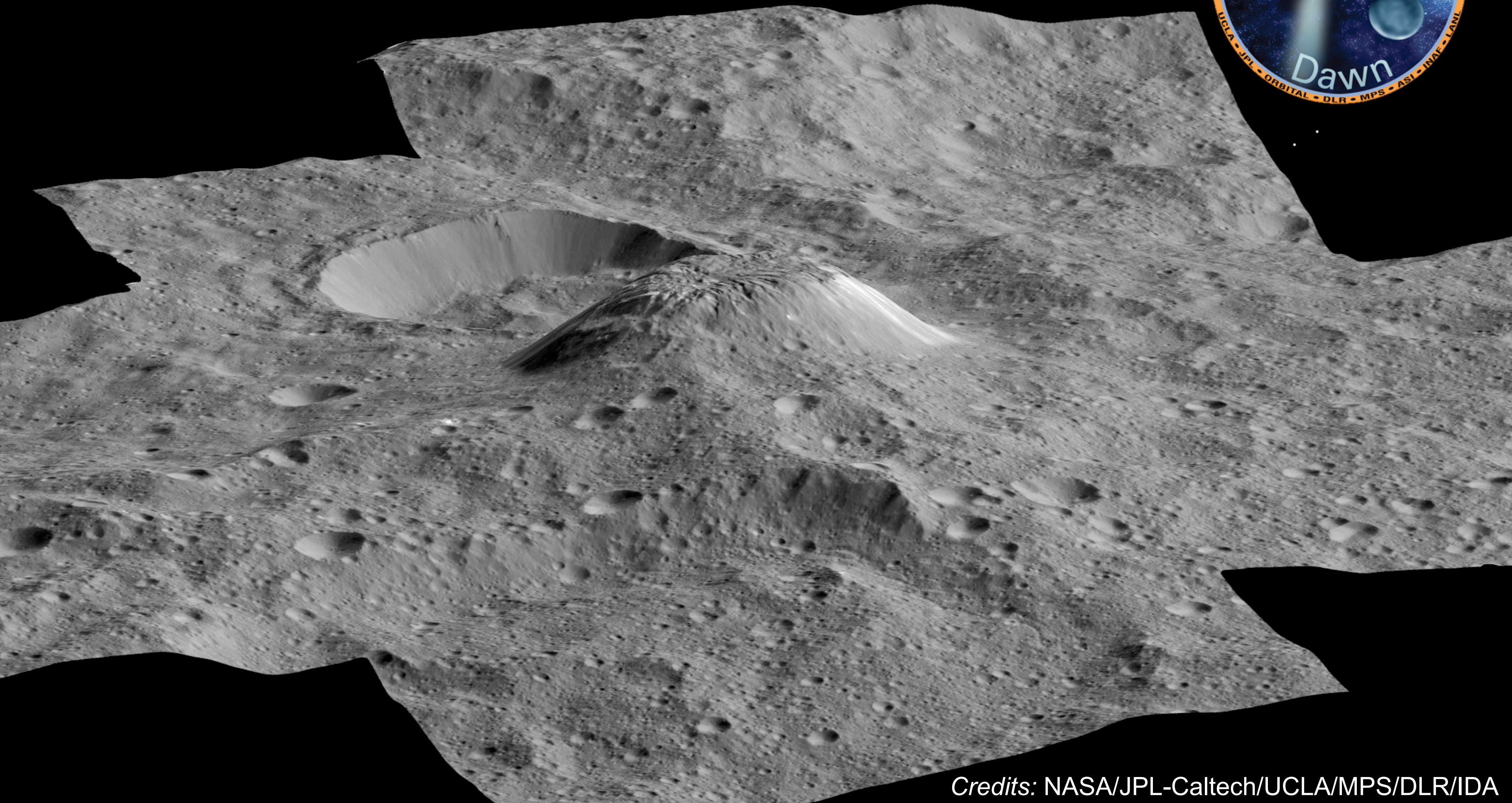


Credits: NASA/JHUAPL/SwRI
March 3, 2016

The reddish enhanced color image (middle) reveals a mountain range located in southeast Cthulhu that’s 260 miles long, largely covered by a layer of dark tholins. The bright peaks are thought to be predominantly methane (right image is a map of methane ice) that has condensed as ice from Pluto’s atmosphere.

Dawn's First Year at Ceres

A Mountain Emerges: Ahuna Mons



Credits: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA
March 7, 2016

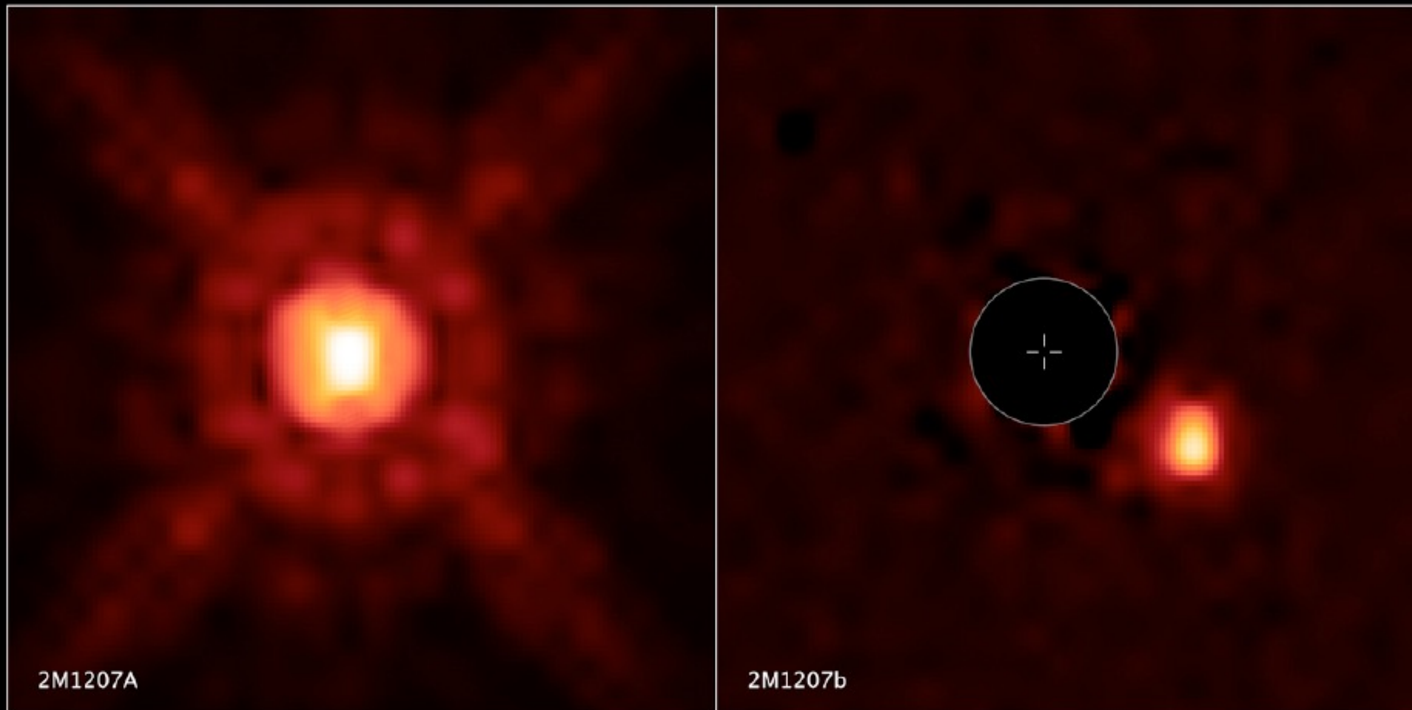
One year ago, on March 6, 2015, the Dawn spacecraft slid into orbit around Ceres, and since then, has delivered a wealth of images and other data of this previously unexplored world. Ahuna Mons has an average height of 4 km, and Dawn's latest images are yielding new details of this enigmatic feature.


National Aeronautics and Space Administration
NASA
Astrophysics

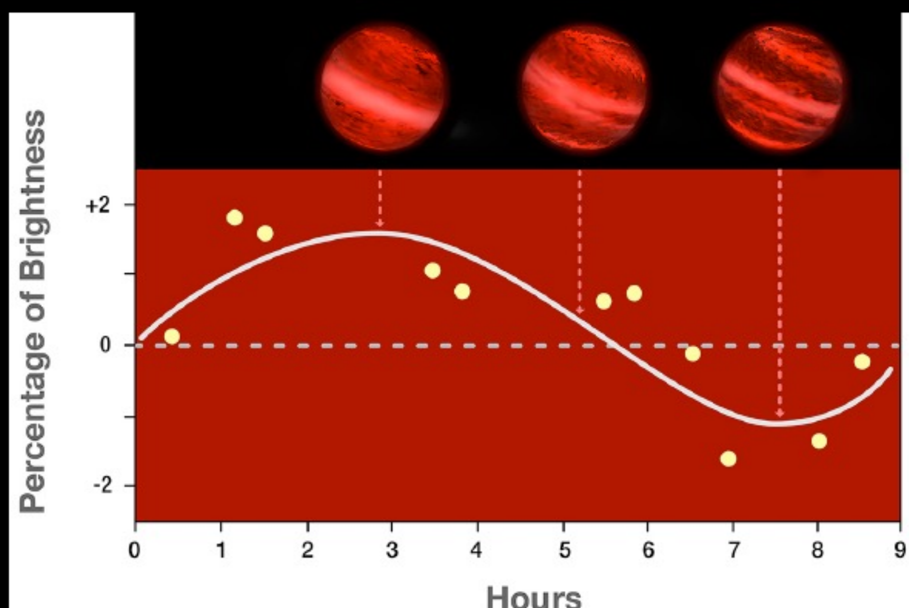
Glow from the Big Bang Allows Discovery of Distant Black Hole Jet (B3 0727+409)

Credit: X–ray: NASA/CXC/ISAS/A.Simionescu et al, Optical: DSS

Brown Dwarf 2M1207A and Companion ▪ *Hubble Space Telescope* WFC3/IR



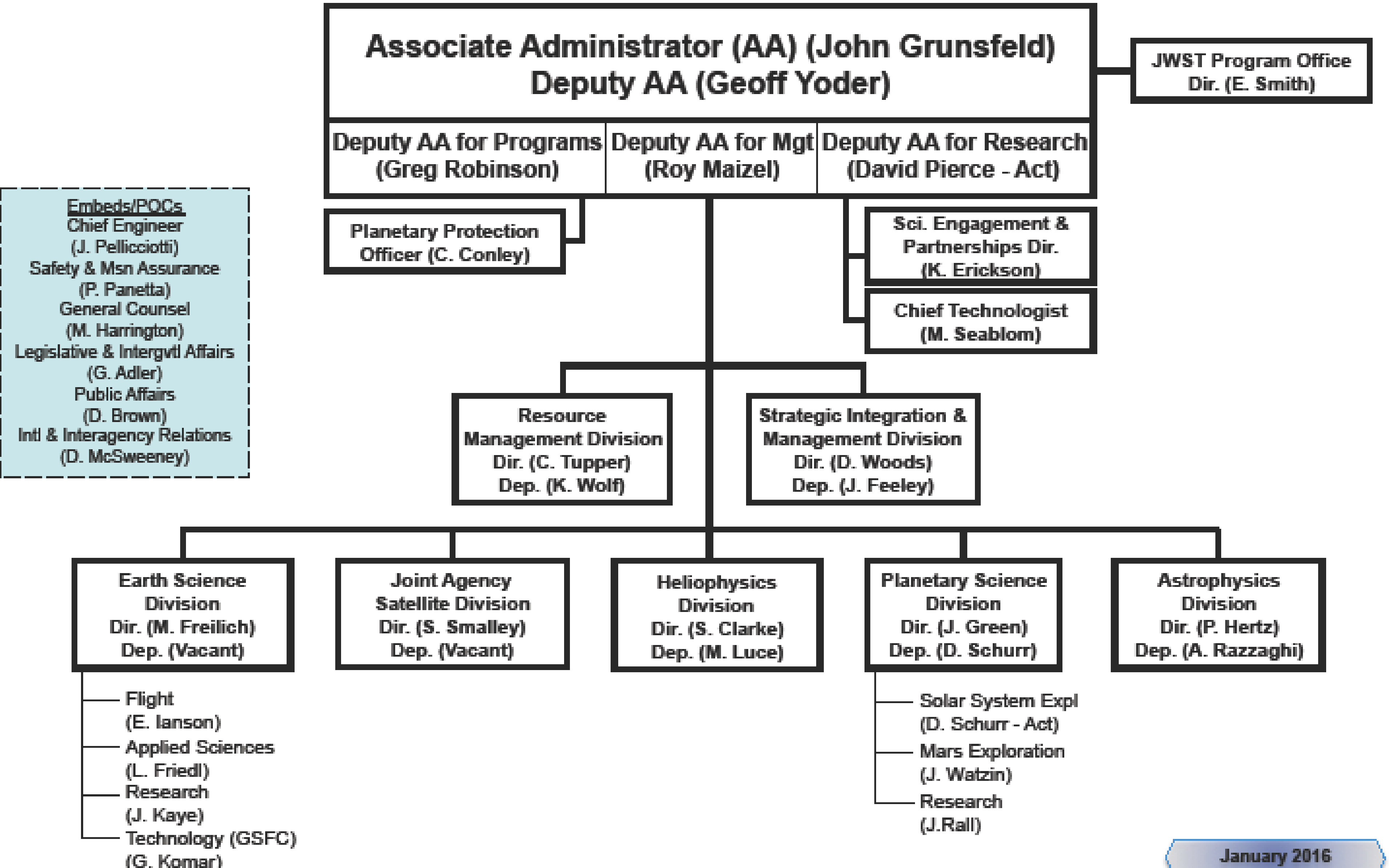
NASA, ESA, and Y. Zhou (University of Arizona) ▪ STScI-PRC16-05b



Outline

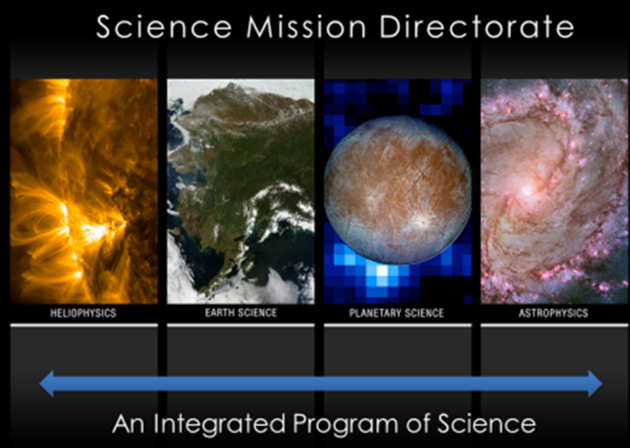
- Science Results
- **Programmatic Status**
  - SMD Overview
  - Heliophysics
  - Earth Science
  - Planetary Science
  - Astrophysics
  - Other Reports
- Findings and Recommendations

SMD Organization



January 2016

SMD AA Dr. John Grunsfeld Remarks to the NAC Science Committee



Our future science looks pretty incredible

What Are the Challenges to this Bright Future ?

- Bold and Consistent Leadership
- Cost and Schedule Performance
- High Quality Workmanship
- Teamwork
- Scientists, Engineers, Technicians, Dreamers (STEM education)

SMD FY 2017 Program Highlights

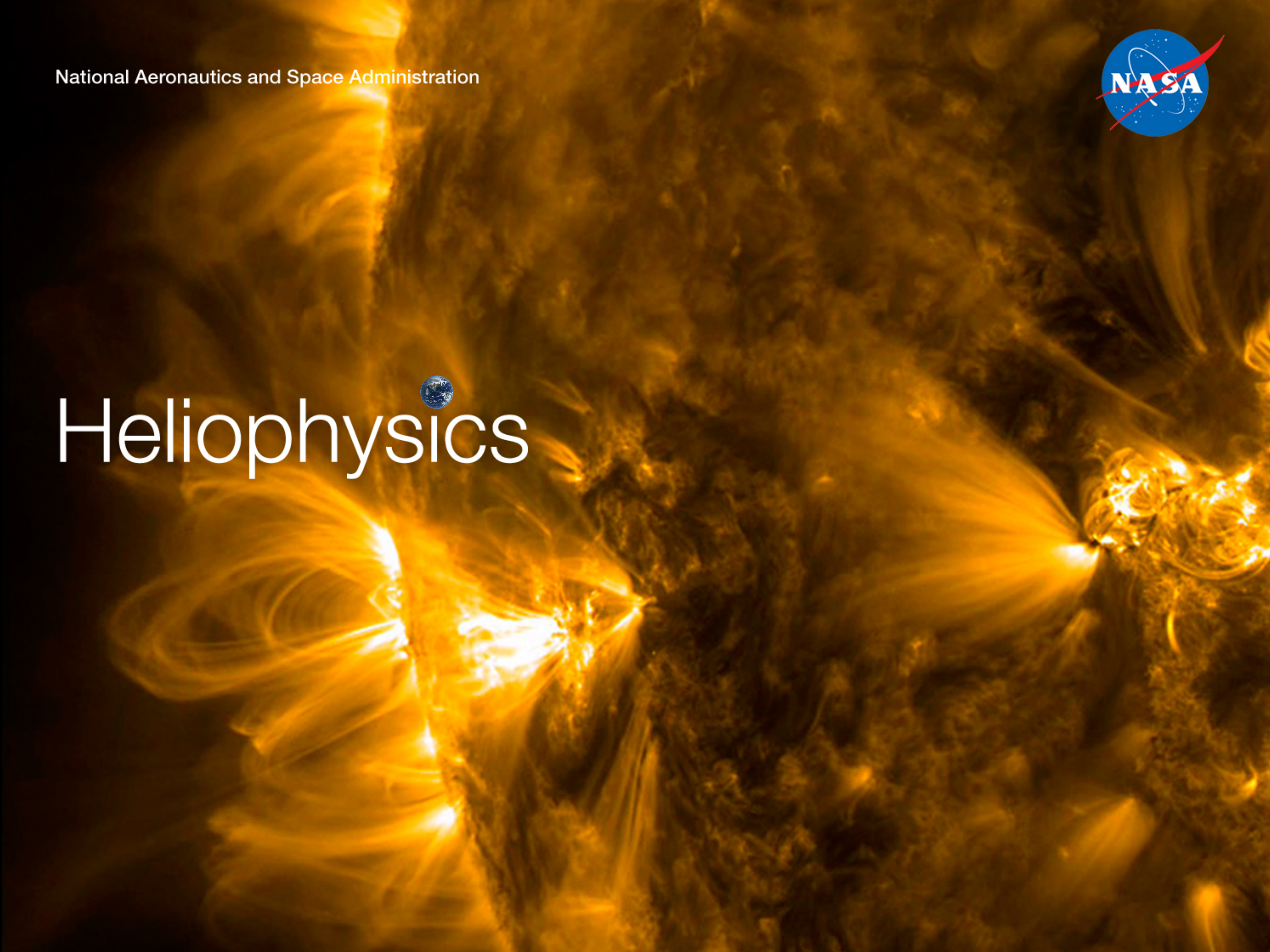
- Supports formulation of a Europa mission
  - Multiple flyby mission entered Phase A formulation in June 2015
  - NASA has initiated a study of lander concepts. Preliminary results show that a lander would add significant cost, schedule risk, and complexity to the flyby mission.
- Supports formulation of WFIRST
  - Enters Phase A formulation after APMC review on 2/17/16
  - FY17 and notional outyear budget profile supports launch as early as 2025
- Accelerates Landsat 9 to FY21, within an ongoing Sustainable Land Imaging program
- Fully funds operating Mars missions
- Increases investments in Planetary technology, including power
- Continues efforts to detect and study NEOs, including study of an Asteroid Impact and Deflection Assessment mission with the European Space Agency (ESA)
- Includes $10M to study a Mars orbiter in the 2020s, in collaboration with STMD and HEOMD
- Increases funding for SMD CubeSats, and initiates a project to advance the use of constellations of small satellites
- Accelerates work in support of the Space Weather Action Plan
- Includes $298M in mandatory funding

Recent Cost Performance

NASA Science is providing reliable cost estimates for its missions, contributing to program stability

	Original Baseline	Current/ Actual	Actual vs. Original
Juno	742.0	708.8	-4%
GRAIL	427.0	398.0	-7%
Suomi NPP	593.0	765.2	29%
NuSTAR	110.0	116.0	5%
Van Allen	534.0	504.0	-6%
Landsat 8	583.4	502.8	-14%
IRIS	141.0	143.0	1%
LADEE	168.0	191.4	14%
MAVEN	567.0	472.0	-17%
GPM	555.0	484.3	-13%
OCO-2	249.0	320.3	29%
SMAP	485.7	454.3	-6%
MMS	857.3	875.3	2%
Total	6012.4	5935.5	-1%

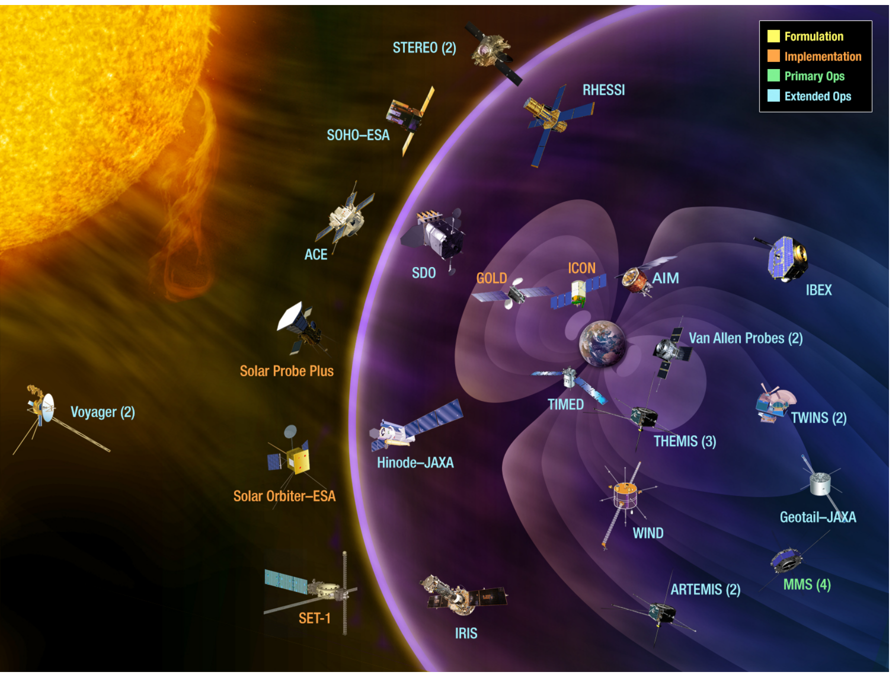
The total cost to develop 13 Science missions launched since August 2011 (excluding MSL/Curiosity) reflects a net underrun of our *original* estimates by 1%.


National Aeronautics and Space Administration
Heliophysics

Heliophysics

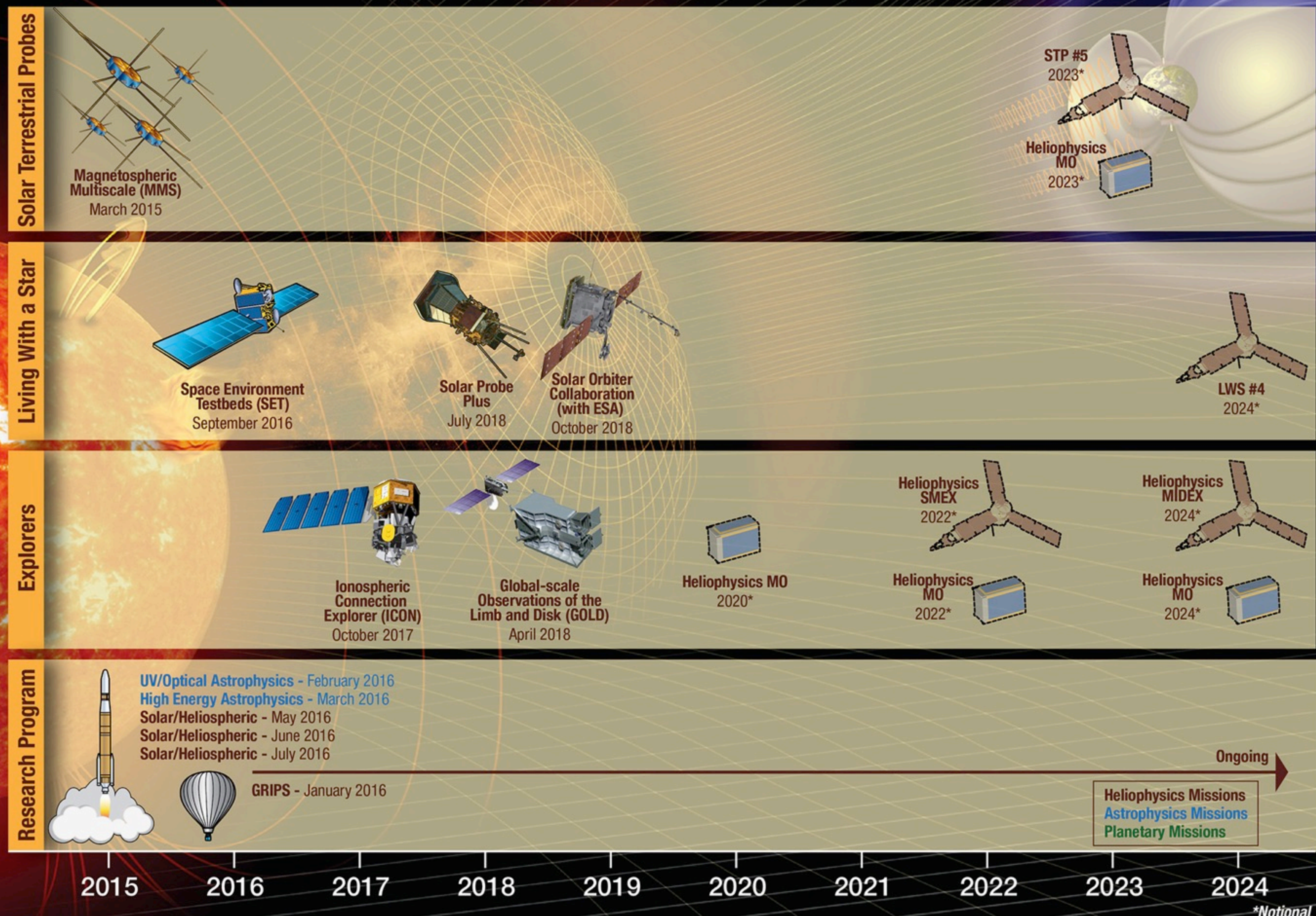
Outyears are notional

($M)	2016	2017	2018	2019	2020	2021
Heliophysics	$650	$699	$684	$698	$715	$724



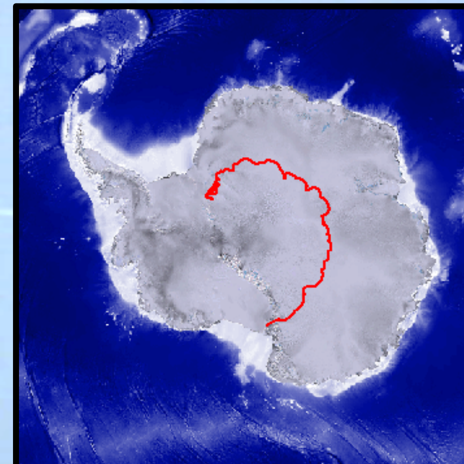
- ➢ Continues Solar Orbiter Collaboration (SOC) partnership with ESA (2018 launch)
- ➢ Continues development of Solar Probe Plus (SPP), Ionospheric Connection Explorer (ICON), and Global-scale Observations of the Limb and Disk (GOLD) all to be launched in FY 2018
- ➢ Operates over 17 Heliophysics missions (31 individual spacecraft)
- ➢ Triples funding for the CubeSat project in FY 2017
- ➢ Supports the National Space Weather Strategy and Action plan
- ➢ Increases support for Research and Analysis, and maintains support of the Sounding Rockets program

Heliophysics Program 2015-2024



Gamma Ray Imager/Polarimeter for Solar flares (GRIPS)

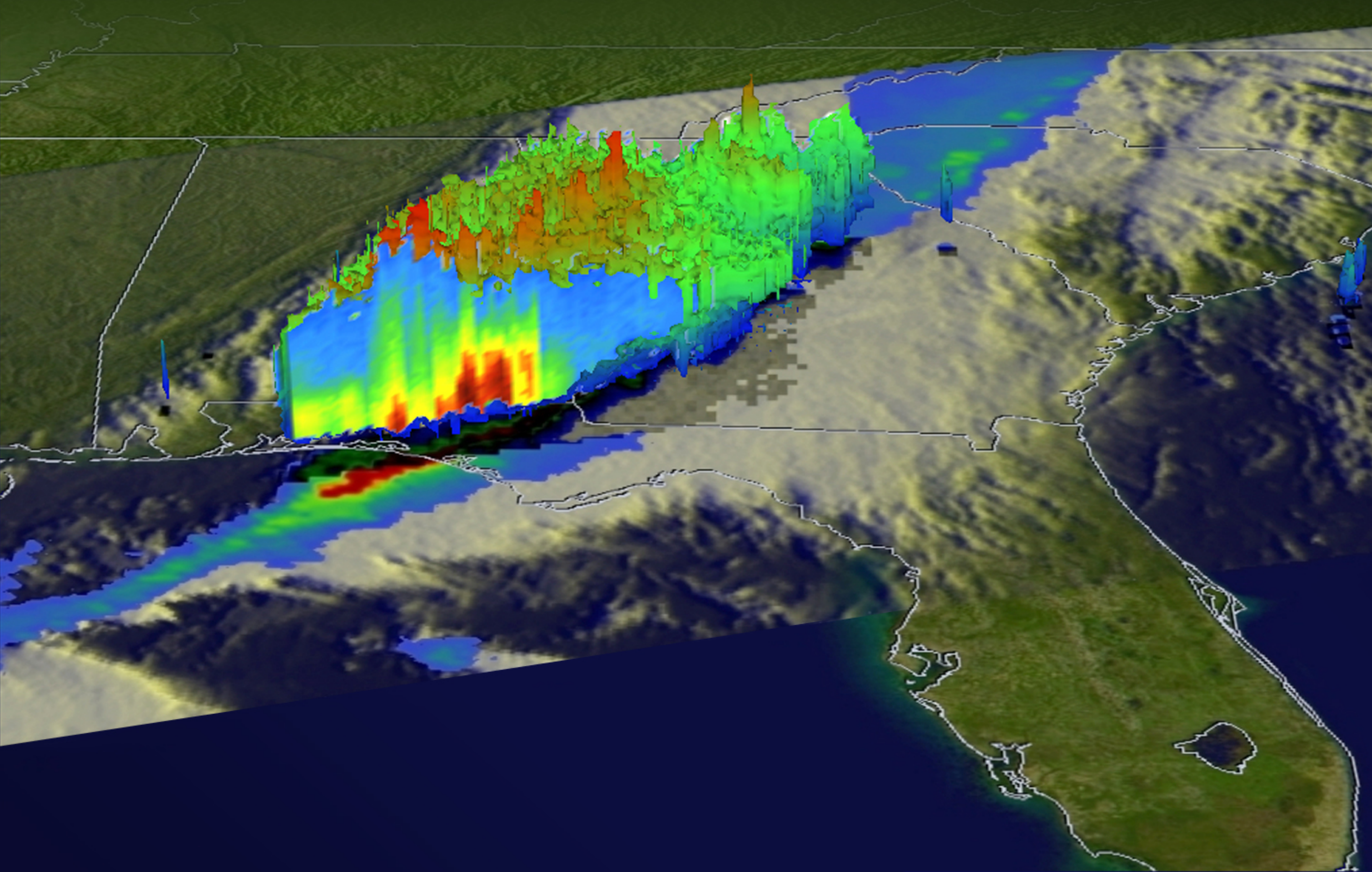
Balloon Missions - Gamma-Ray Imager/Polarimeter for Solar flares (GRIPS)



- PI: Pascal Saint-Hilaire, UCB/SSL
- Designed to observe flare gamma-ray/hard X-ray emission with an unparalleled angular resolution at gamma-ray energies (12.5 arcsec)
- Launched: 19 January 2016 from McMurdo Station, Antarctica

- Flight lasted 11 days, 19 hours, 50 minutes; Mission (Flight 668N) was successfully terminated over East Antarctica to expedite recovery of high priority items.
- 21 C-class flares occurred, with the largest at C9.6, with concurrent RHESSI observations
- Radiation-belt precipitation was observed
- Data vaults successfully recovered

EARTH SCIENCE




(Pre)Formulation
Implementation
Primary Ops
Extended Ops
Sentinel-6A/B
Earth Science Instruments on ISS:
RapidScat, CATS,
LIS, SAGE III, TSIS-1, ECOSTRESS,
GEDI, OCO-3, CLARREO-PF, TSIS-2
Landsat 9
PACE
NI-SAR
SWOT
TEMPO
JPSS-2 (NOAA)
RBI, OMPS-Limb
GRACE-FO (2)
ICESat-2
CYGNSS
ISS
SORCE,
TCTE (NOAA)
NISTAR, EPIC
(NOAA'S DSCOVR)
QuikSCAT
EO-1
Landsat 7
(USGS)
Terra
SMAP
Suomi NPP
(NOAA)
Aqua
Landsat 8
(USGS)
CloudSat
CALIPSO
GPM
Aura
GRACE (2)
OSTM/Jason 2
(NOAA)
OCO-2

ESD Budget/Program Overview

- The FY17-21 budget is executable and balanced, *informed by and consistent with Decadal Survey and national Administration priorities*:
  - **advances Earth system science**
  - **delivers societal benefit through applications development and testing**
  - **provides essential global spaceborne measurements supporting science and operations**
  - **develops and demonstrates technologies for next-generation measurements, and**
  - **complements and is coordinated with activities of other agencies and international partners**

- Funds operations and core data production for on-orbit missions in prime and extended phases, in keeping with 2015 Senior Review recommendations/decisions. Funds NASA portal for Copernicus and other international missions, increasing DAAC capability to host added NASA missions
- Completes high priority missions: **SAGE-III/ISS, ICESat-2, CYGNSS, GRACE-FO, SWOT, TEMPO, RBI, OMPS-Limb, TSIS-1 and -2, CLARREO Pathfinder, Jason-CS/Sentinel-6A,Landsat-9, NISAR**
- Develops (for launch beyond budget window)**: PACE, Landsat-10, Jason-CS/Sentinel-6B**
- Continues all originally **planned Venture Class** solicitations/selections on schedule
- Conducts limited Decadal mission studies, pending release of the 2nd ESAS Decadal Survey

- Supports non-flight elements**: Research, Applied Sciences, and Technology Development**

- Provides support to **National Climate Assessment, USGCRP**, international coordination activities **(CEOS and GEO**), **USGEO, Carbon Monitoring System**, data-related activities (**CDI, BEDI, GCIS**) in support of the Administration's climate initiative, and **GLOBE**

Earth Science Research

Research $K	FY16 (op plan)	FY17	FY18	FY19	FY20	FY21
FY16 PBS	$ 478	$ 417	$ 425	$ 418	$ 414	
FY17 PBS		$ 445	$ 414	$ 400	$ 416	$ 423

<u>Focus Areas</u>

Carbon cycle and Ecosystems

Climate Variability and Change

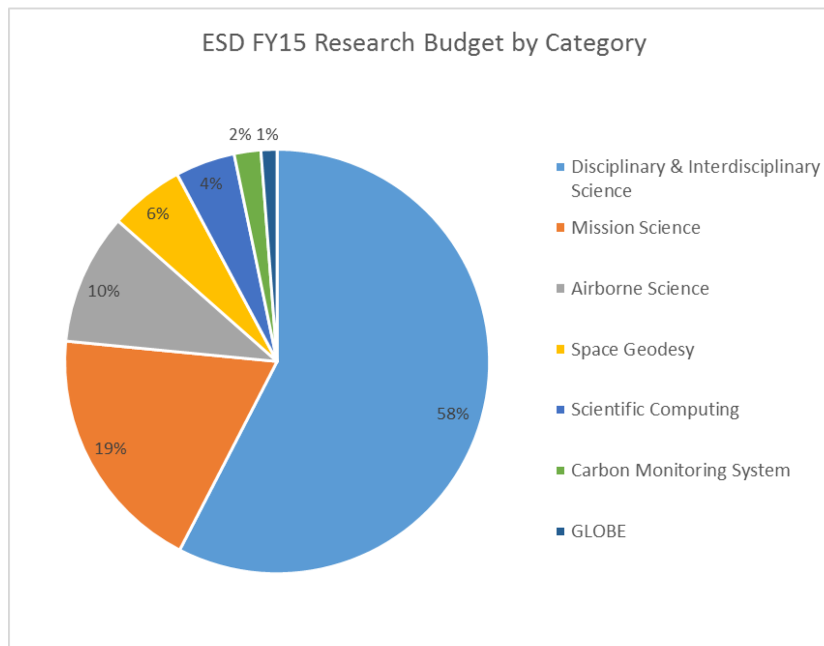
Atmospheric Composition

Global Water and Energy Cycle

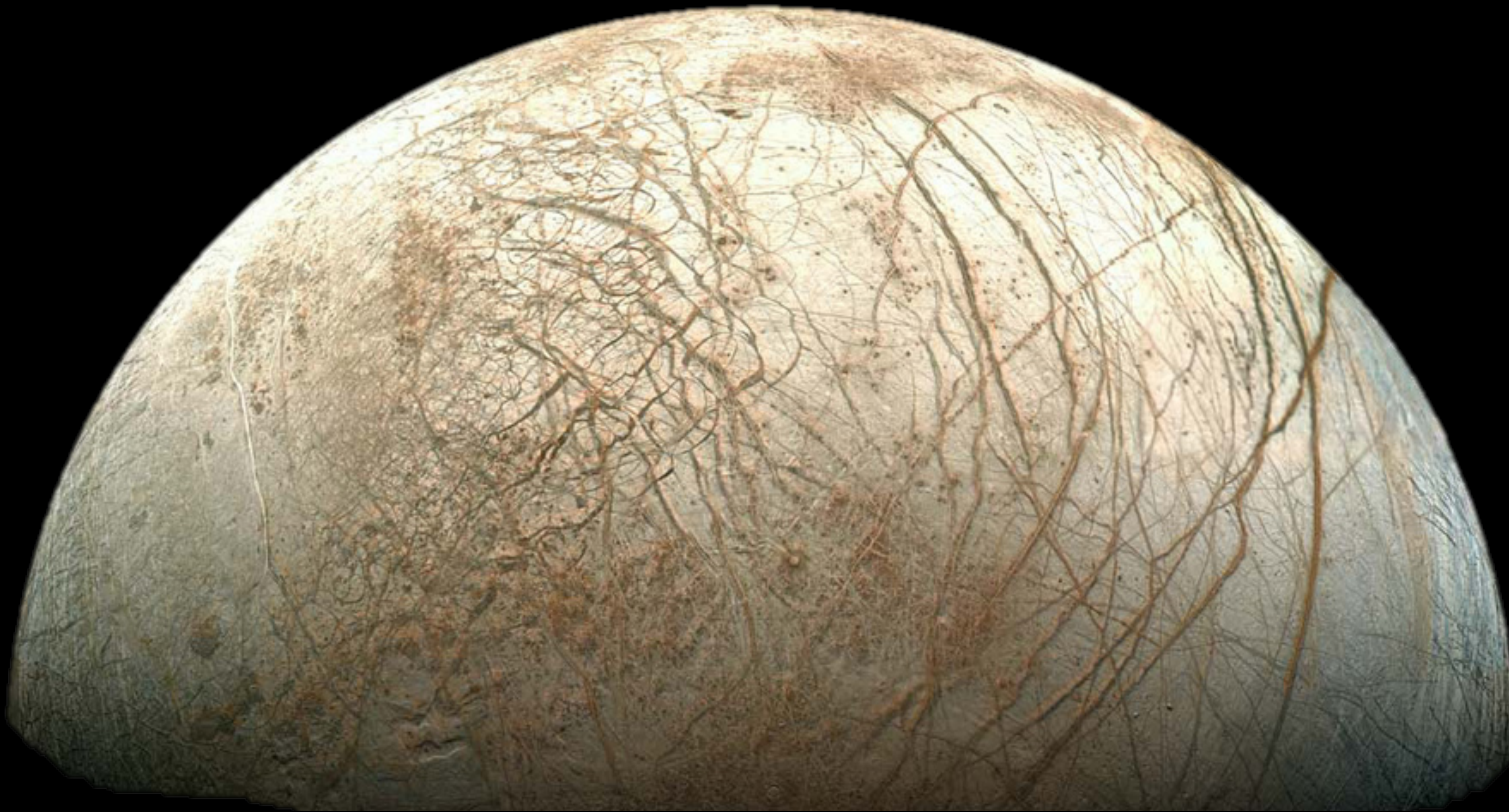
Earth Surface and Interior

Weather

- Subtract DR&T and HECC (~$70 M/year)
- Add Flight mission science teams ($108M-128M/yr)
- Note $30M increase in FY17



Planetary Science



FY16 Appropriation supports a robust Planetary Science program

Planetary Science $270M above the request, at $1.63B

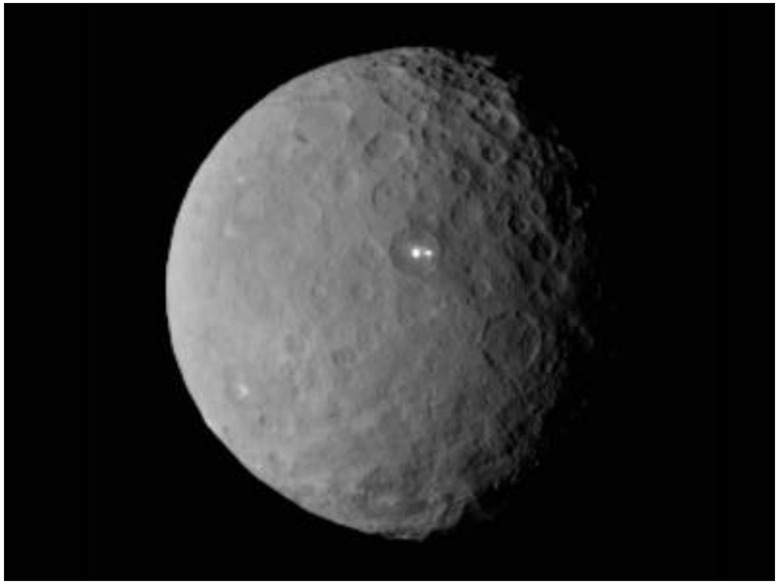
- $277M for Planetary Science Research
- $189M for Discovery (+$33M), including full funding for LRO
- $259M for New Frontiers
- $448M for Mars (+$36M), including full funding for Opportunity
- $197M for Technology (+$55M)
  - Includes $25M for icy satellites surface technology
- $261M for Outer Planets (+$145M) with direction
  - Directs that the Europa mission be launched on an SLS in 2022 and that a lander be included ($175M)
- Direction to continue to fund AIDA/DART joint study with ESA
- Direction to establish a new Ocean Worlds program *with a primary goal to discover extant life on another world* using a mix of Discovery, New Frontiers, and flagship class missions

Planetary Science: President's FY17 Budget

Outyears are notional

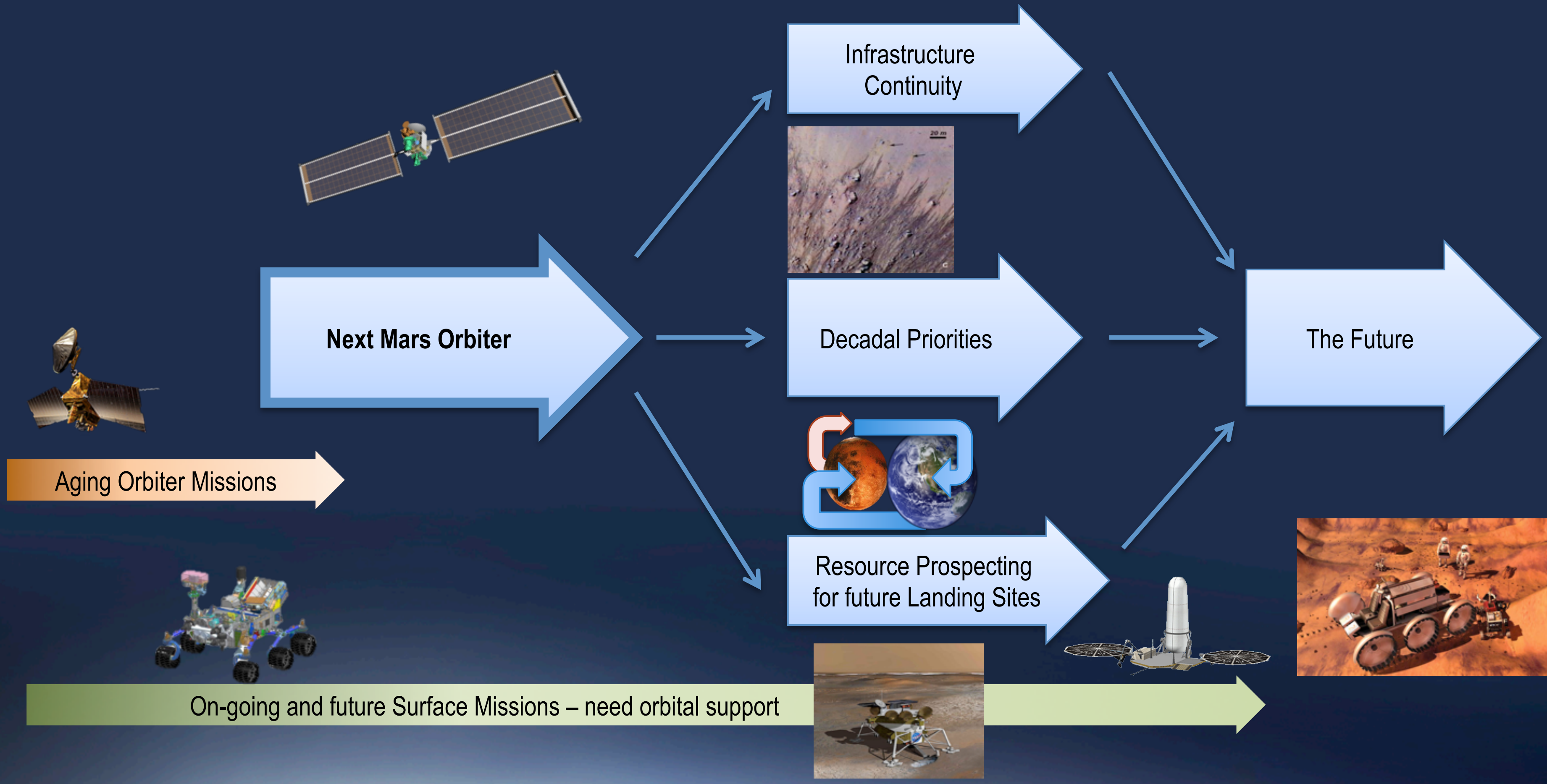
($M)	2016	2017	2018	2019	2020	2021
Planetary Science	$1,631	$1,519	$1,440	$1,520	$1,576	$1,626

- Continues development of the Mars 2020 mission.
- Funds continued formulation of a mission to Jupiter's moon, Europa.
- Continues work on the JUICE instrument in collaboration with the European Space Agency mission to Jupiter.



- Initiates studies for the next New Frontiers Mission and continues operations of Juno and New Horizons.
- Operates 13 Planetary missions including MAVEN, Mars Curiosity, Opportunity, Odyssey, Mars Express, and Cassini (Saturn).
- Increases support for technology development to accelerate future power systems.
- Increases support for Research and Analysis.

Next Orbiter (Under Study): Provide Capabilities that enable many Future Pathways



Timely Renewal and Enhancement of Infrastructure is needed to Support Future Missions

Planetary Defense Coordination Office (PDCO)

Hosted by the Planetary Science Division PDCO is responsible for:

- Oversight of potentially hazardous objects (PHOs):
  - Ensure early detection
  - Characterize PHOs of size large enough to affect Earth's surface
  - Provide warning of potential impact effects if not deflected or mitigated
  - Provide timely and accurate communications about PHOs and any potential impact
- Lead research into potential asteroid deflection and impact mitigation technologies and techniques
- Provide lead coordination role in U.S. Gov't planning for response to an actual impact threat (*e.g.,* planetary science and deep space mission expertise for Federal Emergency Response Team)

National Aeronautics and Space Administration

Astrophysics

Astrophysics - Big Picture

- **The FY16 appropriation and FY17 President's budget request provide funds for NASA ApD to continue its programs, missions, projects, and SR&T.**
  - The total funding (Astrophysics including JWST excluding STEM) remains at ~$1.35B.
  - Fully funds JWST to remain on plan for an October 2018 launch.
  - Funds WFIRST formulation (new start) starting in February 2016.
  - Will require some adjustments to FY16 plans in response to appropriation levels.
  - Will require some adjustments to FY17 proposal depending on Senior Review outcome.
- **The operating missions continue to generate important and compelling science results, and new missions are under development for the future.**
  - Chandra, Fermi, Hubble, Kepler/K2, NuSTAR, Spitzer, Swift, ESA's XMM-Newton all operating well; Senior Review is in Spring 2016 for FY17 and beyond.
  - SOFIA is in 5-year prime operations as of May 2014; HAWC+ 2nd generation instrument to begin commissioning in Spring 2016; 3rd generation instrument concept studies selected; Senior Review for SOFIA is in Spring 2018.
  - ESA's LISA Pathfinder successfully launched on December 3, 2015.
  - JAXA's Hitomi (neé ASTRO-H) successfully launched on February 17, 2016.(update: contact lost on 26 March)
  - Missions under development for launch include NICER (2017), ISS-CREAM (2017), TESS (2017), JWST (2018), ESA's Euclid (2020), WFIRST (mid-2020s).
  - 5 SMEX and MO concept studies selected in 2015; MIDEX AO in 2016; NASA joining ESA's Athena X-ray observatory and ESA's L3 gravitational wave observatory.
- **Progress being made toward recommendations of the 2010 Decadal Survey.**
  - NRC Mid Decade Review (with NSF, DOE) underway; Jackie Hewitt (MIT) is chair; NRC Mid Decade Review committee report expected in May 2016.
  - NASA initiating large mission concept studies as input for 2020 Decadal Survey.

FY17 Budget Request

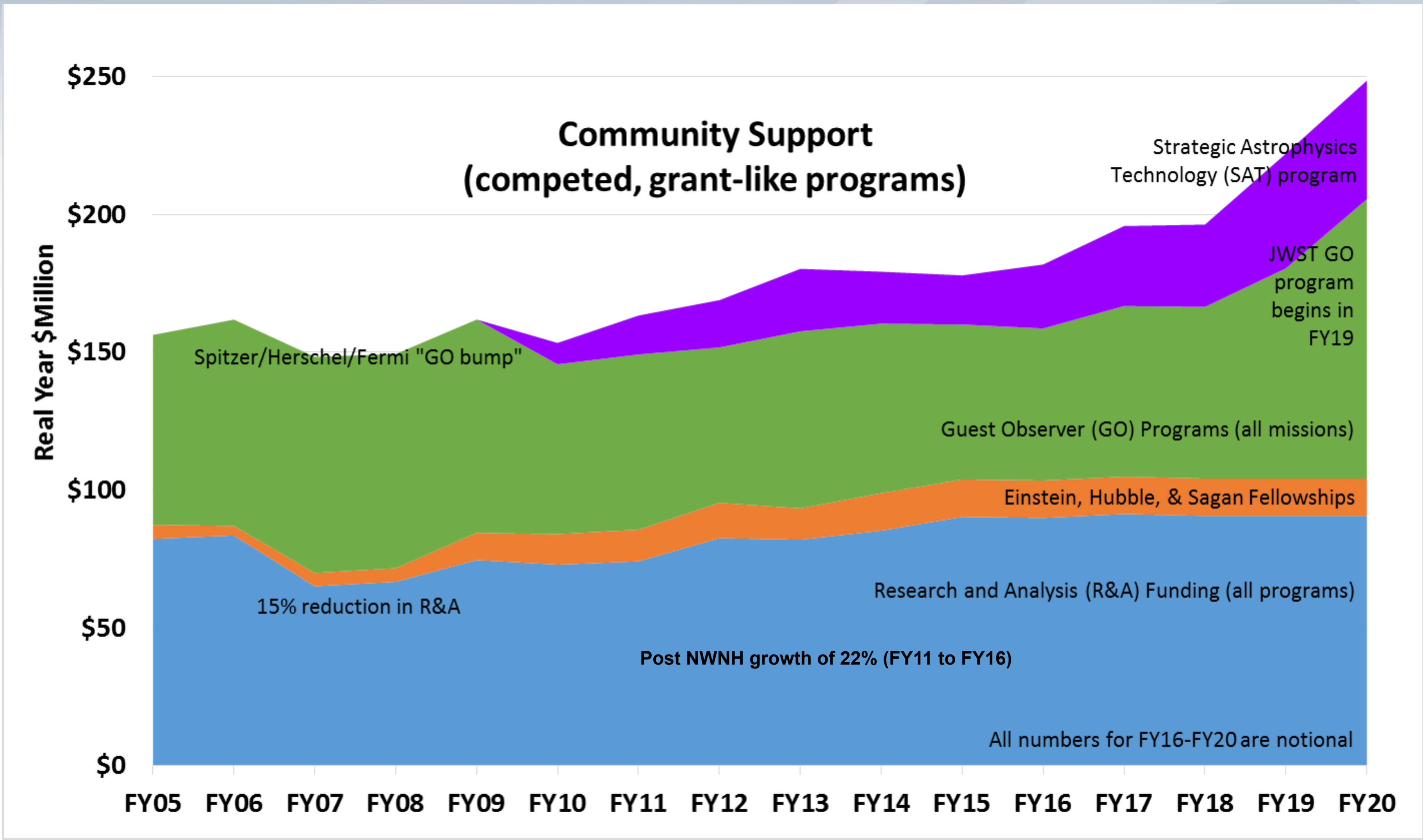
Outyears are notional planning from FY17 budget request

($M)	2015	2016	2017	2018	2019	2020	2021
Astrophysics*	$685	$731	$757	$737	$967	$1094	$1168
JWST	$645	$620	$569	$534	$305	$197	$150
Total*	$1330	$1351	$1326	$1271	$1272	$1291	$1318

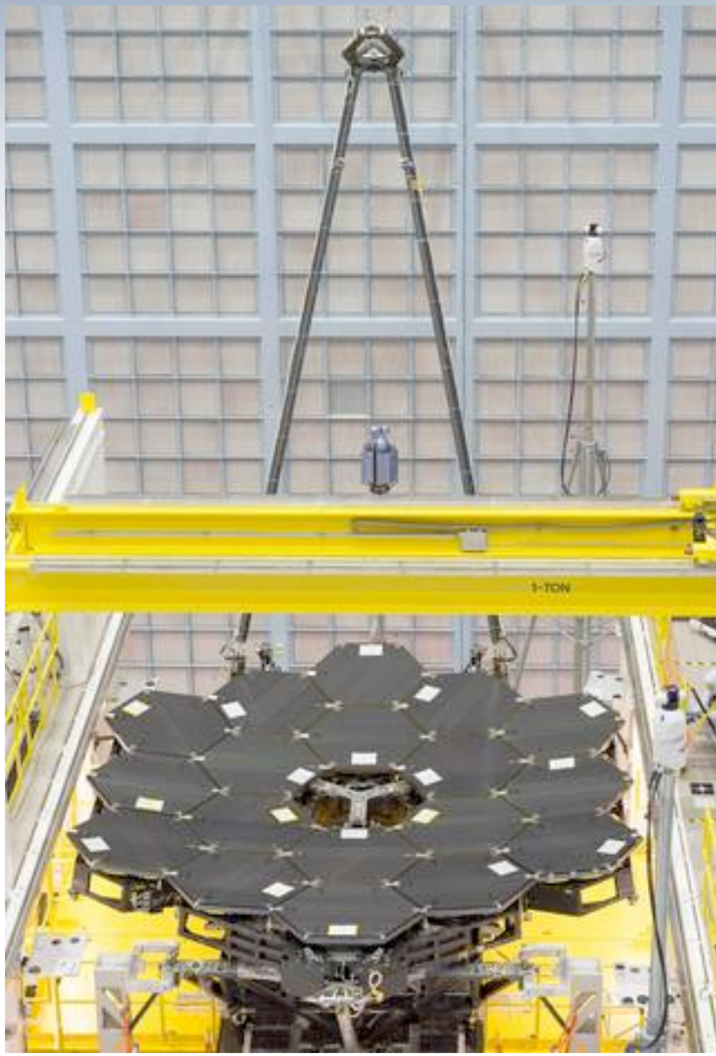
* Excludes "SMD STEM Activities" in all years.

- This budget request is an excellent budget request for NASA Astrophysics ($1,326M excluding STEM).
- It compares well with the FY16 Appropriation ($1,351M excluding STEM) and significantly exceeds the FY17 notional runout in the President's FY16 request for NASA Astrophysics including JWST ($1,276M excluding STEM).
- This budget request and the notional runout allows WFIRST to be executed without additional funding.
- This budget request and the notional runout support other Decadal Survey priorities.
  - Continued Explorer AOs at the Decadal Survey cadence of 4 per decade.
  - Partnerships on ESA's Athena X-ray observatory and L3 gravitational wave observatory.
  - Precursor exoplanet science and technology including Large Binocular Telescope Interferometer, Extreme Precision Doppler Spectrometer, and WFIRST Coronagraph.
  - Retains prior growth in R&A and suborbital programs.
- Senior Review funding may be inadequate to continue all currently operating missions.
  - FY16 budget for Six Senior Review missions is $62M. FY17 Senior Review budget is $37M.

Core Research Support for the Community



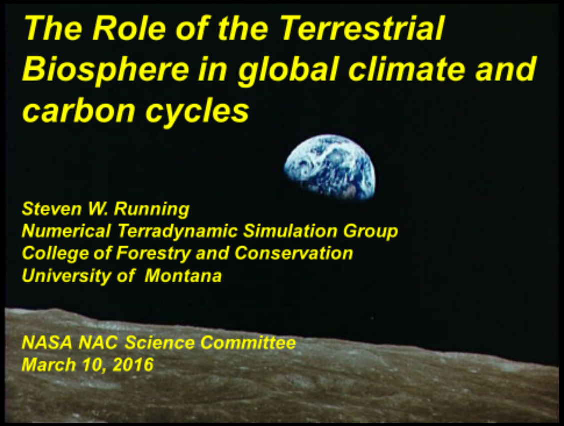
JWST Hardware Progress



JWST remains on track for an October 2018 launch within its replan budget guidelines

http://jwst.nasa.gov/webcam.html

SPACE COMMUNICATIONS
SCaN
AND NAVIGATION

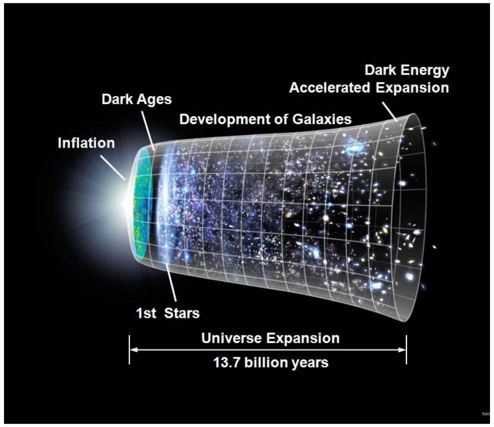


Selected Other Reports

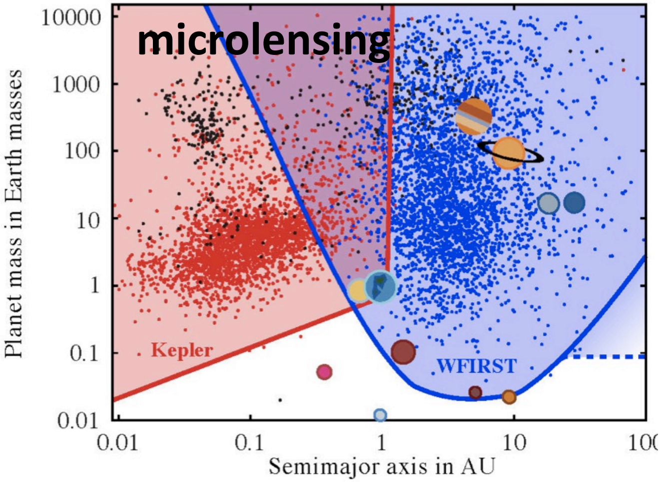
Discovery Science

- WFIRST was highest ranked large space mission in 2010 Decadal Survey
- Use of 2.4m telescope enables
  - Hubble quality imaging over 100x more sky
  - Imaging of exoplanets with 10^{-9} contrast with a coronagraph

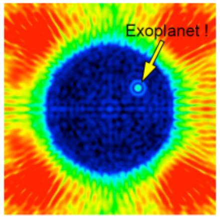
Dark Energy



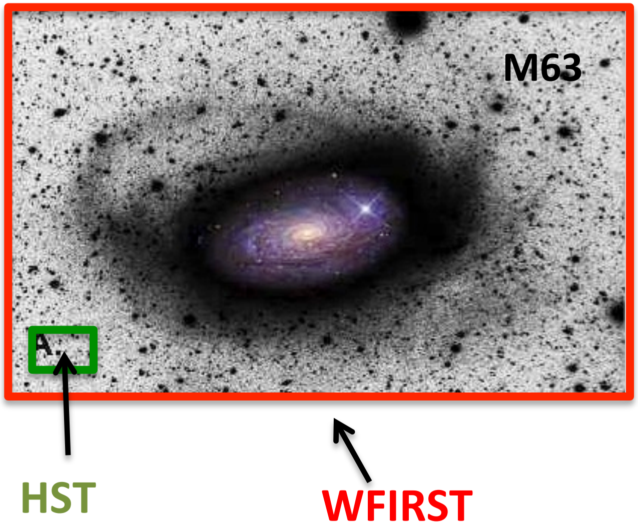
Exoplanets



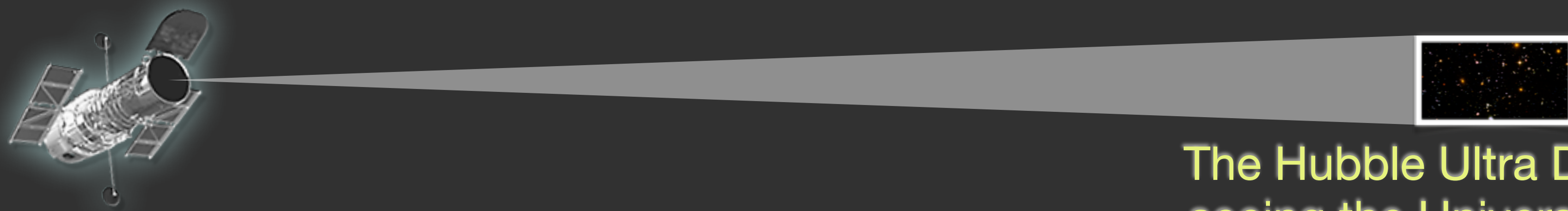
coronagraph



Astrophysics



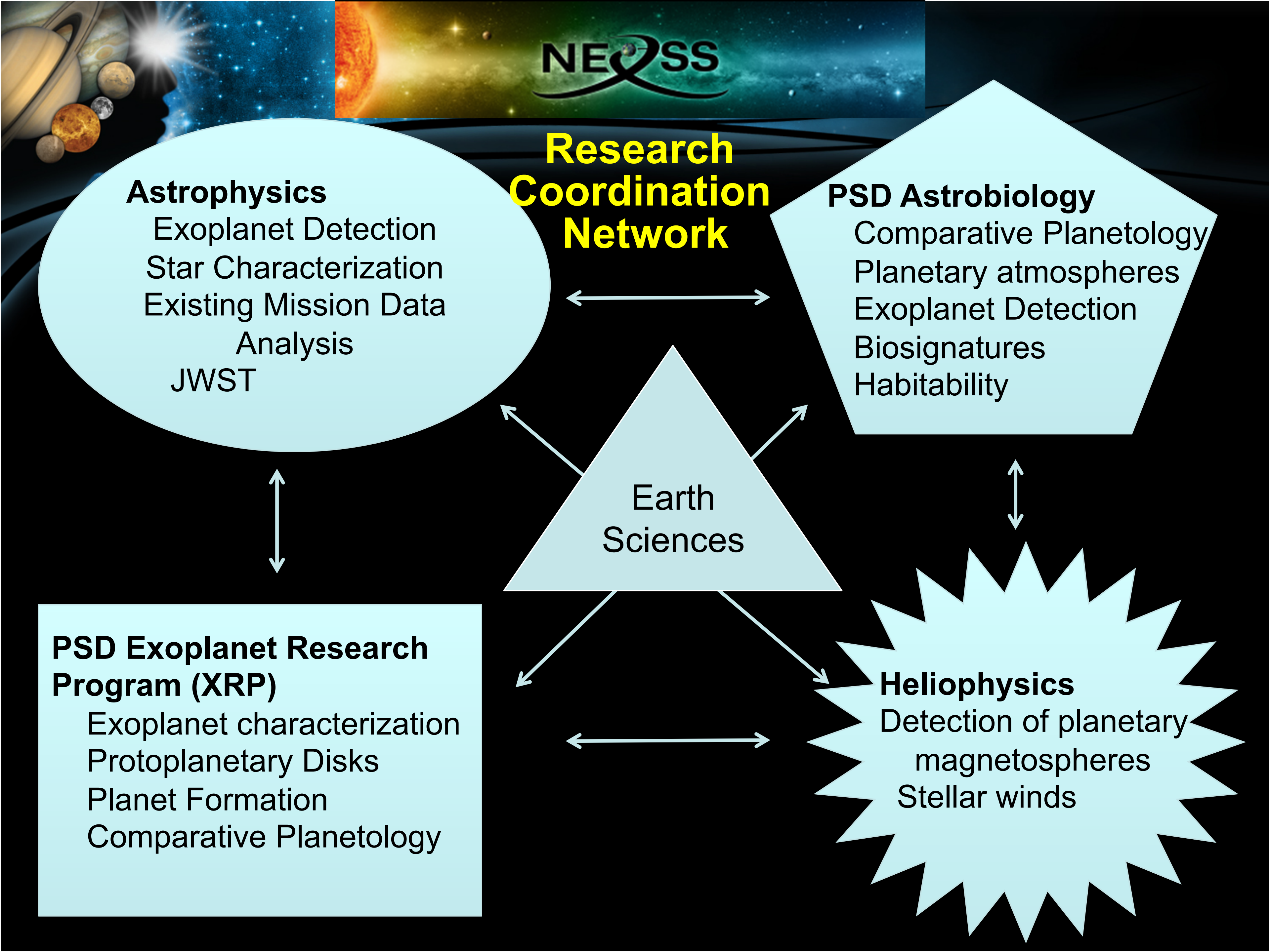
Hubble - A Spectacular Start



The Hubble Ultra Deep Field seeing the Universe, 10,000 galaxies at a time

WFIRST-AFTA - Hubble X 100

An AFTA/WFIRST Deep Field
A New Window on the Universe - **1,000,000** galaxies at a time


NExSS
Research Coordination Network
Astrophysics
Exoplanet Detection
Star Characterization
Existing Mission Data Analysis
JWST
PSD Astrobiology
Comparative Planetology
Planetary atmospheres
Exoplanet Detection
Biosignatures
Habitability
Earth Sciences
PSD Exoplanet Research Program (XRP)
Exoplanet characterization
Protoplanetary Disks
Planet Formation
Comparative Planetology
Heliophysics
Detection of planetary magnetospheres
Stellar winds

Space Communications and Navigation (SCAN): NASA Networks Span the Globe

Deep Space Network | Near Earth Network | Space Network

Big Data Task Force

Inaugural Meeting: February 16, 2016

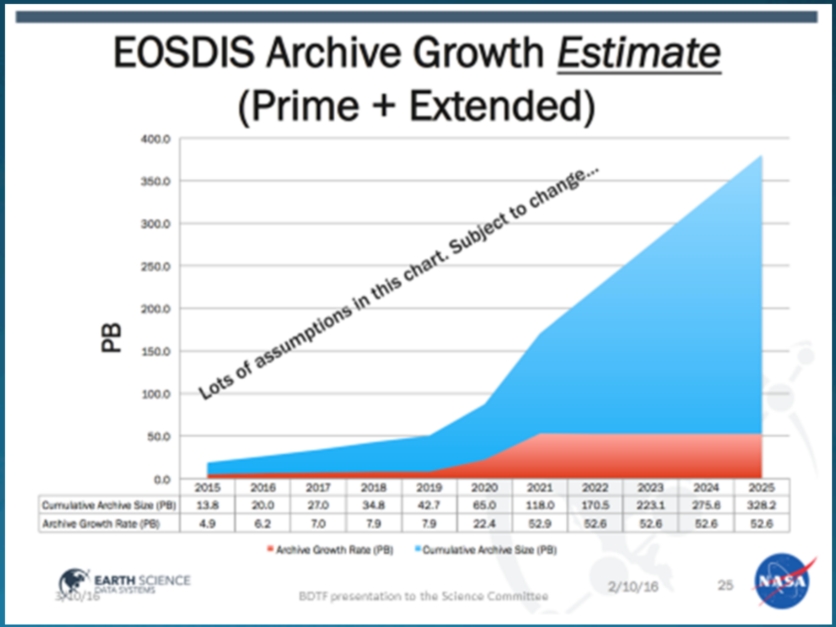
View of Dr. Charles Holmes, Chair: BDTF will recommend to the NAC Science Committee and to NASA/SMD several courses of action intended to improve the science return from NASA's extensive data stores and which will enable new discoveries. One of the goals is to seek areas to leverage NASA's science resources with on-going projects in the government and industry.

Draft BDTF Workplan

- Survey
- Nominate topics
- Choose 3 to 4 topics
- Produce products
- Concise statement of problem: Research, Organize and develop positions, Form consensus, Draft and present results (white paper, presentation)

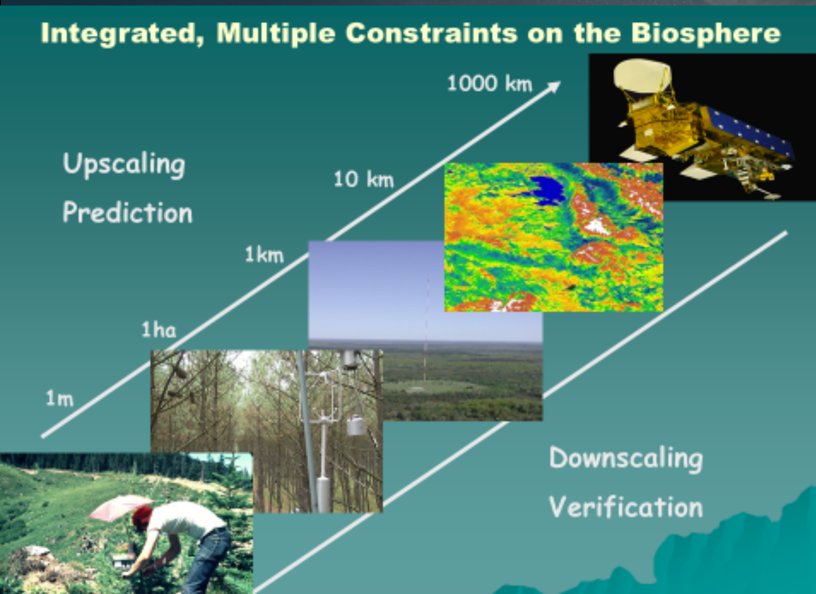
Potential Topic: Long-term Planning of NASA's Big Data Capabilities

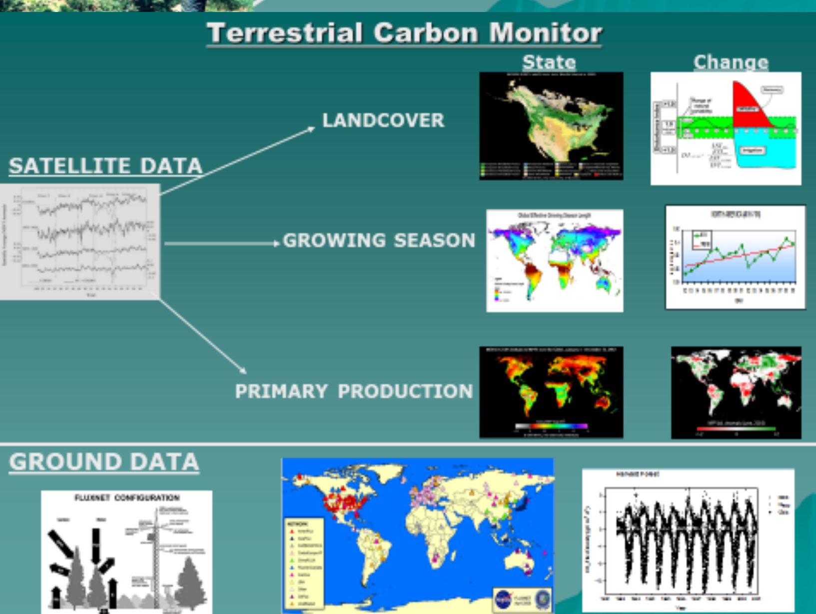
SMD's data activities are projected to maintain or even accelerate their growth. Are there adequate planning activities focused on future needs and solutions for SMD's data infrastructure? Infrastructure tends to have flat budgets that include upgrades/refreshes.



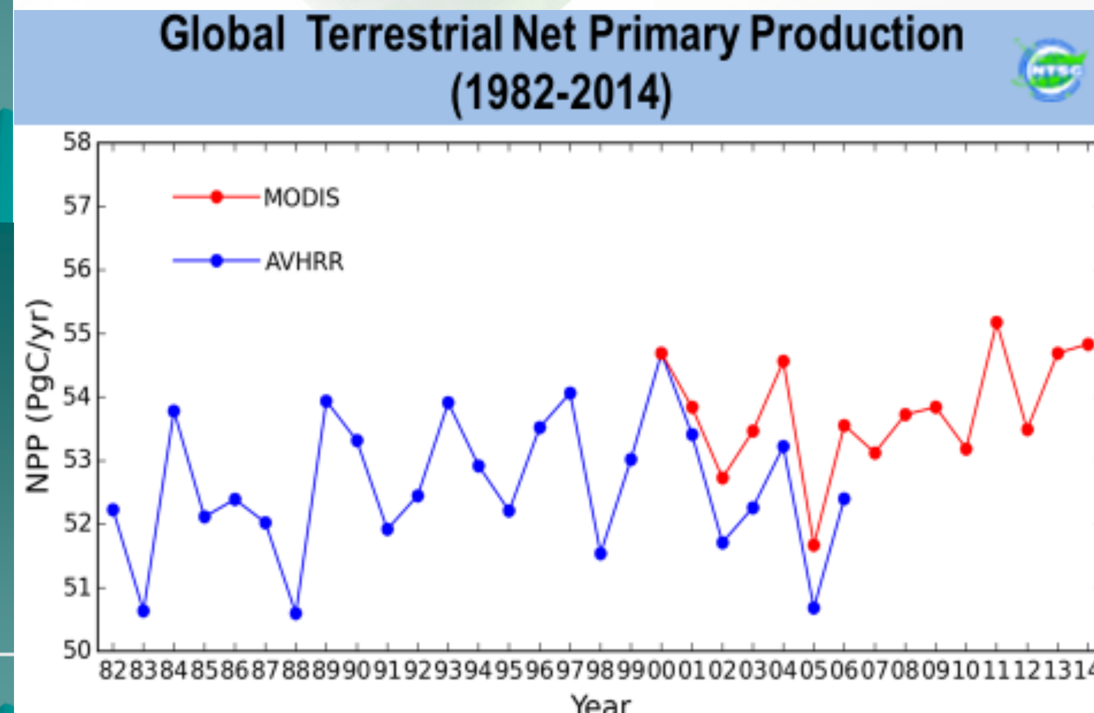
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Cumulative Archive Size (PB)	13.8	20.0	27.0	34.8	42.7	65.0	118.0	170.5	223.1	275.6	328.2
Archive Growth Rate (PB)	4.9	6.2	7.0	7.9	7.9	22.4	52.9	52.6	52.6	52.6	52.6

Role of Terrestrial Biosphere in Global Climate and Carbon Cycles – Dr. Steven Running





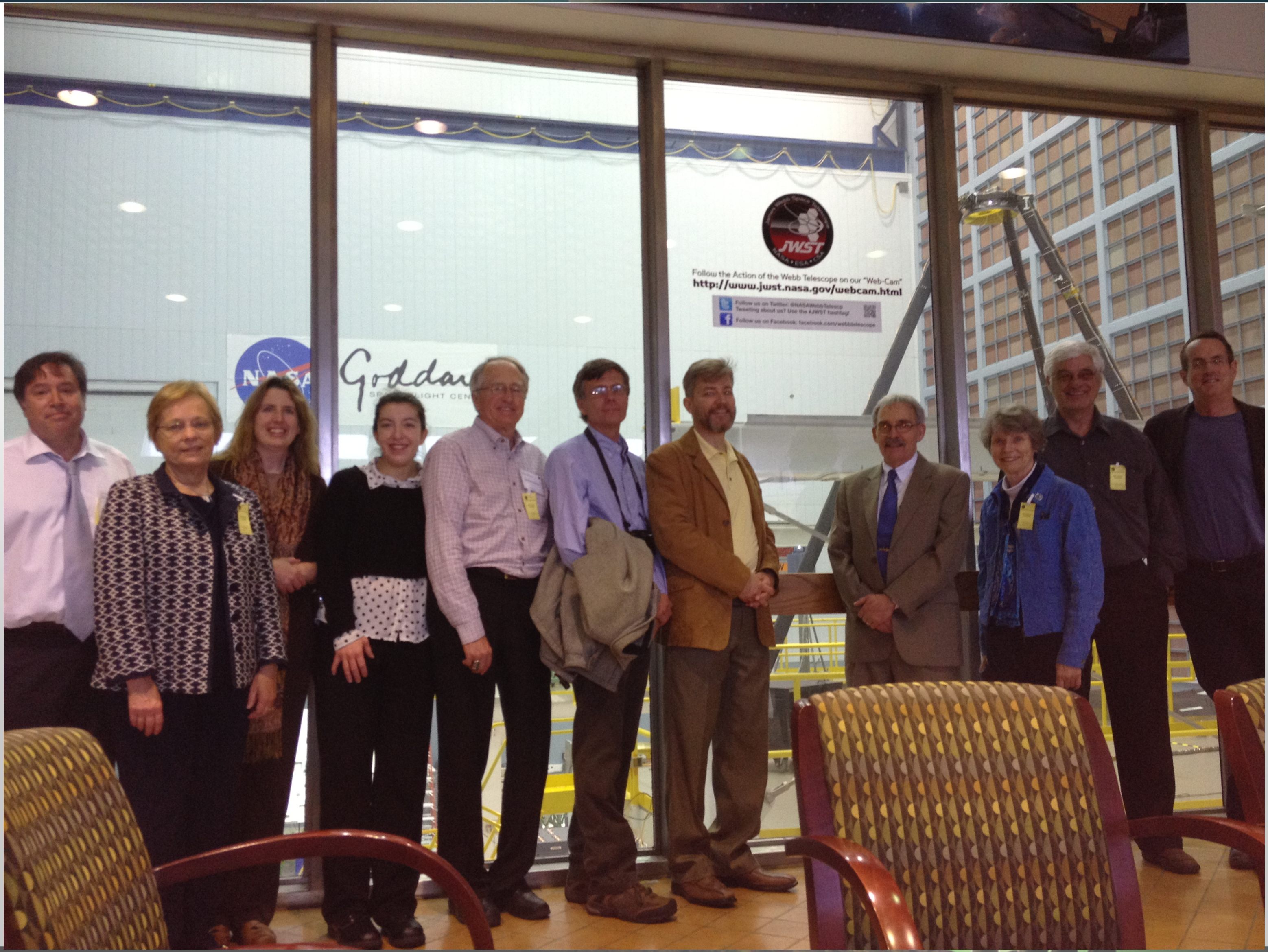
Is our current consumption of Biospheric Net Primary Production (NPP) sustainable?



+/- 1Pg or about 2%

Nemani et al 2003, Zhao and Running 2010

Goddard Briefings on JWST, ICESat-2, and Earth Science Mission Control Center



Outline

- Science Results
- Programmatic Status
- **Findings and Recommendations**

SC Recommendation: NASA Planning for Full System-Level Sterilization

Request Transmission to SMD AA

Recommendation: In order to ensure that future scientific instruments can meet the challenges of planetary protection implementations for missions to worlds that could support Earth life, the Science Committee, on behalf of the Planetary Protection Subcommittee, recommends that NASA provide support to enable instrument developers to qualify and employ construction methods that will be compatible with the use of system-level dry heat microbial reduction (DHMR) over the appropriate time/temperature range.

Concomitantly, the Committee recommends that NASA benchmark or consider engaging the SSB to conduct a study to identify successful approaches by which modern instruments can be subjected to the current suite of commercially available microbial-reduction methods, including the use of DHMR. Approaches from other fields (including medical, military, and food-industry practitioners) would be particularly important to evaluate. Methods identified for use should be compatible with implementation strategies capable of complying with the regulatory framework for planetary protection currently in use by NASA and COSPAR.

SC Recommendation: NASA Planning for Full System-Level Sterilization (cont.)

Request Transmission to SMD AA

Major Reasons for the Recommendation

In the past, the Space Studies Board (SSB) has made recommendations about the measures that should be taken to protect potentially habitable worlds (e.g., Mars, Europa, and Enceladus) from terrestrial contamination, often reflecting the rigor with which the Viking landers and orbiters of the mid-1970s were treated to reduce biological contamination. Based on SSB recommendations, knowledge of Earth organisms, and ongoing scientific discoveries regarding these potentially habitable worlds, it is clear that methods to reduce or eliminate biological contamination on outbound and inbound space missions (and preventing recontamination) will continue to be necessary for the most compelling targets.

Consequences of No Action on the Recommendation

Future NASA science, particularly life detection efforts and in-situ exploration of special regions, may not be possible without the development of new instruments amenable to dry heat microbial reduction (DHMR) or other commercially available microbial reduction methods.

SC Finding: Deep Space Network

Finding: The Planetary Science Subcommittee (PSS) is alarmed by reports of increasing data losses by active planetary missions (e.g. Cassini, with details provided by the Outer Planets Assessment Group (OPAG) in their February 2016 finding on the DSN), especially following a 10% funding cut to the DSN at the end of 2015. The PSS supports aggressive efforts to address this issue and would like to hear updates as soon as possible. In particular, current NASA science missions using the DSN should be asked to inform NASA about recent DSN performance changes they have experienced.